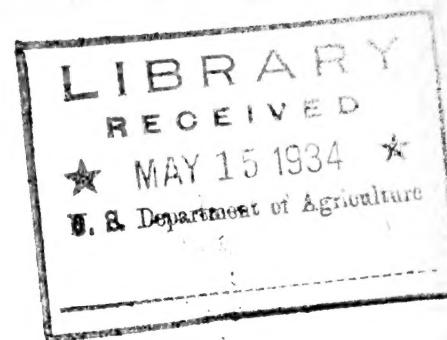


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MONTHLY LETTER OF THE BUREAU OF ENTOMOLOGY

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PLANT DISEASE CONTROL BECOMES PART OF BUREAU OF ENTOMOLOGY

Under date of November 29 Secretary Wallace announced the establishment of a Division of Plant Disease Eradication and Control in the Bureau of Entomology. The work of this division will include the eradication and control of phony peach disease, white pine blister rust, barberry, citrus canker, and Dutch elm disease heretofore carried on in the Bureau of Plant Industry. The work of the division will be directed by Karl F. Zellerman, who is well known in the Department and who has to his credit a list of notable achievements among which are outstanding accomplishments in the field of plant-disease eradication. Federal Civil Works projects are under way for the control of the Dutch elm disease, citrus canker, and phony peach disease. These and certain other features of the work are now being handled through the offices of the Bureau of Entomology, although full transfer will not become effective until January 1, 1934.

THE WORK UNDER STORED PRODUCT AND HOUSEHOLD INSECTS TO BE DISTRIBUTED AMONG OTHER DIVISIONS

In solving many problems incident to the control of insects attacking agricultural products in storage it is necessary to study the product in the field where it may have become infested. Under these conditions some of the work may overlap that carried on in other divisions. Many common household insects are pests largely because they affect or annoy man. Many phases of the investigations on such pests are closely related to those concerned with the house fly, mosquitoes, etc., which also annoy man and which are being studied in the Division of Insects Affecting Man and Animals. Any effort to group the diversified work on insects affecting man and his crops is, at best, more or less arbitrary. It is believed, however, that investigations can be better coordinated if the problems relating to the insects affecting a particular crop, or products manufactured from it, are unified, rather than divided on the basis of whether the injury be most evident in the field, in the granary or other storage place, or in the mill or warehouse. The Division of Stored Product and Household Insects will be discontinued at an early date and the work assigned to other divisions. Activities concerned with household pests will be assigned to the Division of In-

sects Affecting Man and Animals; those concerned with insects affecting grains, to Cereal and Forage Insects; those concerned with insects affecting fruits, to Fruit Insects; those concerned with insects affecting wood products, to Forest Insects; and those concerned with insects attacking peas, beans, and tobacco, to Truck Crop and Garden Insects. The general direction and planning of the work for some activities have already been transferred and all reassignments will be effective prior to the active season. Because of E. A. Back's special interest in the control of household insects, he will be assigned to the Division of Insects Affecting Man and Animals and will continue in this phase of the work, giving particular attention to investigations.

USE OF OFFICIAL AUTOMOBILES

Despite instructions issued from time to time, there still seems to be uncertainty in some quarters concerning the uses which may and may not be made of official automobiles. All employees, of course, understand that it is proper to use a Government car for purely official purposes and improper to employ it for purely personal uses. The difficulty seems to be in the interpretation of border-line cases, particularly those involving the use of automobiles for transporting an employee from his residence to his post of duty.

It should be said in the beginning that permission for such use can be obtained only from Washington. No field-station head is authorized to make such use of a car himself or to permit any employee to do so without the express approval of the Chief of Bureau. In cases involving passenger-carrying cars the approval of the Secretary of Agriculture is necessary.

In considering the granting of approval the first thing to be considered is the interest of the Government. If an official station lacks adequate garage facilities and an employee is willing to house a car in his own garage without expense to the Government, there is no objection to his using the car between his home and his official station morning and night. Such a course is clearly dictated by the necessity of protecting a car from theft or vandalism. However, when such a situation exists it does not afford justification for the employee who has received such authority to pick up and transport to and from the official station other members of the staff. Likewise, the necessity of picking up mail from the post office does not in itself warrant the use of an official car between home and station since there is no reason why an employee should not stop by the post office in his own car on his way to work in the morning; neither does it justify the use of an official car to take several members of the staff to their homes or to the down-town section for

lunch, since it would be necessary for only one member to make the trip to the post office for the noon mail. An employee is not warranted in taking his children to school or other members of his family to their places of employment on his way to work in an official car, even though he may have been authorized to use the car between his home and place of duty.

Needless to say all Government cars should be properly marked with the regular decalcomanias and should be equipped with U.S.D.A. tags, except in the few States that do not recognize the Department tags but require State tags. Exceptions are also made where Government identification marks would endanger the safety of the operator or the success of the work. Approval from Washington, however, is required in such cases.

A personally owned car being used on a mileage reimbursement basis is, during the time of such use, in exactly the same category as a Government owned car and its use at such times is subject to the same restrictions.

It is not the intention of the administrative office of the Bureau to impose hardships on employees traveling by automobile on official business. There can be no legitimate doubt, however, that the only persons who may properly be carried in a Government car or personal car being used on Government business are those whose presence is necessary to the transaction of the business concerned. Any variation from this policy will sooner or later lead to criticism and difficulties, particularly in towns and small cities where Government representatives are well known and where their activities are more subject to public observation and comment than would be the case in a large city. Most of our stations are located in such places. This last consideration is primarily one of expediency. Aside from that angle, and more fundamental, is the fact that there should be no shadow of personal advantage to any employee through the use of official property. This is not only an ideal, but a practical policy which all Government representatives should have constantly in mind.

FRUIT AND SHADE TREE INSECTS

Bureau a clearing house for codling moth results.--In order to make the past season's results on codling moth control available at once to interested entomologists and others, the Bureau of Entomology has served as a clearing house. Reports have been received from a large number of workers and have been compiled, summarized, mimeographed, and sent out. The first copies were placed in the mails on December 16.

Grape phylloxera a grape-root problem in the East.--Contrary to usually accepted ideas as to injury by the grape phylloxera in the eastern part of the United States, *Phylloxera vitifoliae* Fitch has been found causing serious injury to the roots of grapevines in the variety planting maintained by the Bureau of Plant Industry at Arlington Farm (P. O., Rosslyn), Va. In order to obtain detailed information as to varietal susceptibility under eastern conditions, G. A. Runner, in charge of the Bureau's grape-insect work at Sandusky, Ohio, spent about 3 weeks in October and November making a careful examination of the roots of nearly 300 varieties of grapes. Many instances were found in which the accepted ideas of varietal susceptibility did not hold. Another interesting observation has been the absence of leaf galls, which are usually more abundant in the East than are root injuries. Further study of this interesting situation is contemplated.

Efficiency of oil against codling moth eggs of different ages.--R. F. Szama, in charge of the Vincennes, Ind., laboratory, reports results of experiments which indicate that the efficiency of oil as an ovicide for the codling moth varies with the age of the eggs. In the experiments the eggs were most susceptible to an 0.5 percent summer oil emulsion when they were in the "red-ring stage," i.e., 3 days old, under normal high summer temperatures. His results are summarized as follows:

Age of eggs when sprayed	Eggs hatched	
	Number	Percent
One day	6,628	24.4
Two days	7,629	25.2
Three days (red-ring stage)	5,863	10.7
Four days (black-spot stage)	11,047	32.5
Checks, unsprayed	6,477	35.4

JAPANESE AND ASIATIC BEETLES

Incidence of larval disease.--H. Fox and T. N. Dobbins, Moorestown, N. J., report that the relative proportion of dead and obviously diseased larvae of the Japanese beetle (*Popillia japonica* Newm.) found during the November surveys is less than that in the preceding fall months. This situation is believed due to decreasing soil temperature, which inhibited biotic activity.

Effect of various stickers on the adhesion of lead arsenate to foliage.--Tests by F. W. Metzger and L. Koblitsky, Moorestown, during the past summer have shown that flour and fish oil are of ap-

proximately equal value in increasing the adhesiveness of lead arsenate to apple foliage. Coated lead arsenate, although somewhat more effective in this respect than lead arsenate alone, was inferior to either of the above-mentioned stickers when they were used with lead arsenate at comparable dosages.

Introduced parasites.--J. W. Balock, Moorestown, reports that 23,000 cocoons of the grub parasite Tiphia vernalis Rohwer, received from Japan in September and kept at normal temperature in the warm cellar, were transferred on November 6 to the refrigeration cellar for overwintering. The cocoons were examined and fungused cocoons totaling 1,417 were removed. The number of fungused cocoons discarded at the time the shipment was received was 4,448. This brings the total number of cocoons lost through fungus to 5,865, or about 20 percent.

Influence of ants on Jap beetle grub population.--According to R. T. White, Moorestown, five large samples from field colonies of ants belonging to the genera Formica, Lasius, and Myrmica were placed in glass cages in the laboratory. The queens, and sometimes numbers of males, were placed in the cages with the workers. The ants seemed entirely unaware of their captivity and could be observed readily at all times. Grubs of P. japonica were placed in the cages several days before the ants were added to allow them to become oriented and thus not excite the ants in their new quarters. Cages were left undisturbed for a period of 34 days and then examined for living grubs. In all cases the grub mortality was exactly the same in the check cage containing only grubs as it was in the corresponding cage containing both ants and grubs. In all cages the ant runways and galleries spread throughout the soil and, although in some cases living grubs were within half an inch of permanent galleries, the ants showed no tendency to molest the grubs. Data from these tests indicate that the species of ants used do not destroy or even molest living grubs in the soil. More experiments, with other species of ants, are now under way at the laboratory.

Emergency relief labor.--Labor to the extent of 123 man-days has been furnished by the local relief administrator for grub-survey work at Moorestown, N. J., and Westbury, N. Y.

Host-plant preferences of Asiatic garden beetle.--H. C. Hallock reports that, in a study of the selection by adults of Autorhagus castanea Arrow of plants on which to feed and to oviposit, a screened cage 24 feet long and 4 feet wide was built on the laboratory grounds at Westbury, N. Y. The cage was divided into 16 compartments, each 4 feet by 18 inches, and in each compartment was a different variety of plant. The compartments were separated by strips of metal extending from the surface of the ground to a depth

of 6 inches. The cage was left open above the ground so that beetles could move about and choose plants for feeding. Early in July 65 beetles were placed in each compartment, making a total of 1,040 in the cage. Counts of the beetles feeding in the different compartments were made with a flashlight on 10 evenings to obtain information on the host-plant preference. Late in the fall the ground in each compartment was examined and the larvae were counted to obtain data on the choice of oviposition places. In the accompanying table the number of beetles feeding on carrots is taken as 100, and in determining the choice of oviposition places the number of grubs around orange hawkweed is taken as 100.

Plant in compartment	Relative beetle population on plants	Relative grub population about roots
Strawberry	26	59
Orange hawkweed . . .	20	100
Grass (long)	6	20
Grass (short)	16	31
Carnation	3	56
Radish	18	19
Iris	3	23
Chrysanthemum	91	45
Aster	32	26
Delphinium	7	20
Strawberry (mulched) .	31	20
Snapdragon	5	45
White clover	10	61
Sedum acre	4	29
Cotton	15	26
Carrot	100	46

Estimates of the defoliation in the various compartments were as follows: Carrots, 100 percent; asters, 75 percent; chrysanthemums, 60 percent; and strawberries, 25 percent. On other plants the feeding was too light to be estimated.

TRUCK CROP AND GARDEN INSECTS

C. H. Popenoe

C. H. Popenoe, Associate Entomologist of the Division, died suddenly early Friday morning, November 17. Mr. Popenoe was appointed as a Special Agent of the Bureau on June 14, 1907. His early work with the Bureau was on general truck-crop pests and he was assigned to Norfolk, Va. During recent years he had been working on bramble

pests, particularly on the relation of certain plant lice to transmission of bramble mosaic. Last year he was assigned to a study of oil atomization as a possible control for insect pests that attack low-growing vegetable crops, and he had made some notable progress. Mr. Popenoe was the first to use carbon tetrachloride as a fumigant and, in cooperation with E. H. Siegler, of the Fruit Insects Division, he pioneered in investigations of fatty acids as insecticides. He was one of the first to use thallium as an ant poison. Just prior to his death he had completed a rather extensive revision of Farmers' Bulletin 1371 on Diseases and Insects of Garden Vegetables. This bulletin is one of the most popular that the Division has for distribution. He had also completed a revision of Farmers' Bulletin 1286 on The Red-Necked Raspberry Cane Borer. Mr. Popenoe's leaving us so suddenly was keenly felt by his many friends, not only in the Bureau, but throughout the Department.

Oviposition-site preferences of two species of elaterid beetles.--

E. W. Jones, of the Walla Walla, Wash., laboratory, reports as follows: "With Phelates canus Lec. and P. californicus Mann. the choice of the exact spot for oviposition seems to depend largely on the moisture content of the soil and the degree of compactness of the surface. Soil-cage experiments early in the spring showed that both species laid large numbers of eggs in loose irrigated loam soils with a moisture content of over 20 percent (70 percent W.H.C. or over). Two soil conditions were avoided completely by the egg-laying adults: (1) A loose dry soil mulch of 6 inches containing 5 percent or less moisture, and a similar condition where the soil was drying owing to a sod cover without irrigation; (2) well-packed soil into which they were not able to burrow and lay eggs. The packed soil was moist, but the compactness was too much of a limiting factor. Barnyard manure was added to one cage of loose moist soil, while a second cage of loose moist soil without the manure was held as a control. About an equal number of eggs were laid in both cages, indicating that manure was not an attractant for the beetles."

Sugar-beet yields in Idaho confirm prediction.--J. C. Chamberlin, of the Twin Falls, Idaho, laboratory, reports that the sugar-beet harvest was completed in the Twin Falls-Jerome area about November 18, with a yield of 14.24 tons per acre. This yield was exceeded only in 1927 and in 1932, when yields averaged 16.98 and 16.43 tons per acre, respectively. An estimate made in April of yield to be expected, and determined on the basis of correlation with available weather data and population studies of Eutettix tenellus Bak., vector of curly-top disease, indicated that the mean yield for the current year would be 13.95 tons per acre. This is a surprisingly close approximation of the actual tonnage obtained.

High mortality rate of Eutettix tenellus indicated by fat studies.--R. A. Fulton, Twin Falls, reports that during November beet leafhoppers forced from Russian thistle to sage have shown a progressive decrease of 20 to 15 percent in total fat; the last determination, 23.6 percent, on December 10, being lower than determinations for 1931 and 1932 on the same date. This indicates the probability of a high mortality rate from starvation, provided the present drought continues. Newly germinated mustard plants have been found to carry very little food value, as reflected by the inability of leafhoppers feeding thereon to accumulate a reserve of glycerides. Germination of mustards after this date would probably change the total fat content very little. These determinations indicate the probability of a high winter mortality rate because of deficient reserve food supply.

Duration of egg period of E. tenellus under various temperatures.--F. H. Harries, Twin Falls, in studies on the duration of the egg period of E. tenellus having possible field application in the estimation of the date of migration, has conducted two tests in which direct temperature summations have been compared with the thermal constant indicated by constant-temperature data. In the first test, eggs were deposited during a 12-hour period at 90° F., were then transferred to the insectary at varying temperatures for 6 days, and were finally allowed to hatch at 90° F. The mean time spent at 90° F. was 3.91 days, or 122.38 effective day-degrees. The temperature accumulation during 6 days in the insectary was 72.17 day-degrees, or a total of 194.55 day-degrees, which approaches rather closely the theoretical thermal constant of 196 day-degrees. In the second test, under somewhat different temperature conditions, the accumulation was 188 day-degrees, compared with the theoretical thermal constant of 196 and determined on the basis of constant temperatures. Daily alternations of temperatures have indicated some acceleration of development over the constant temperature results, though it is doubtful if these differences are large enough to be of importance in field work. Studies on the rate of oviposition at different relative humidities indicate that relative humidity between 20 and 90 percent at 90° F. probably has no effect on the rate of egg-laying.

Action of dusts and sprays against Mexican bean beetle in New Mexico.--J. R. Douglass, Estancia, N. Mex., summarizes as follows the action of various sprays and dusts against Epilachna corrupta Muls.: "In the dusting tests derris led in the percentage killed, followed in order by Cubor dust, zinc arsenite, calcium arsenate (Corona), sodium fluosilicate, cryolite, calcium arsenate (Niagara), calcium arsenate (Dow), magnesium arsenate, lead arsenate, and barium fluosilicate; whereas in the spraying tests zinc arsenite led in the percentage killed, followed in order by calcium arsenate (Corona), mag-

nesium arsenate, lead arsenate, calcium arsenate (Niagara), calcium arsenate (Dow), cryolite, sodium fluosilicate, and barium fluosilicate. Derris dusts containing 1, 2, and 3 percent rotenone were very effective against overwintered beetles, larvae, and newly developed beetles. Derris containing 1 percent rotenone was more effective than Cubor dust." Field tests indicated that calcium arsenate is the cheapest material. It continues to be the most generally effective under field conditions for the dry-farmed areas of the Southwest.

Insecticide results on *Sternechus paludatus* (Casey).--Mr. Douglass gives the following summary of insecticidal results against the weevil *Sternechus paludatus* (Casey): "In the dust tests zinc arsenite led in the percentage killed, followed by magnesium arsenate, calcium arsenate (Niagara), lead arsenate, barium fluosilicate, and sodium fluosilicate. In the spray test, zinc arsenite led in the percentage killed, followed by lead arsenate, calcium arsenate (Niagara), barium fluosilicate, magnesium arsenate, and sodium fluosilicate. Cubor dust and derris, containing 3 and 5 percent rotenone, were not effective in killing this weevil."

Celery leaf tier infestation of storage houses.--N. F. Howard, Columbus, Ohio, reports an infestation of the celery leaf tier (*Phlyctaenia rubigalis* Guen.) on celery in storage houses near Sandusky, Ohio. The celery stored in these houses was taken from the field, the roots being partially cut off by a corn cultivator. Mud was shaken from the roots and the stalks placed upright over the floor of the house without leaving any aisles. The county agent had been called in to aid the grower, and cyanide fumigation to the extent of 1 ounce to 100 cubic feet had been tried without control. The celery in the house that had been fumigated had apparently been injured by the fumigation. The owner had started to shake the larvae from each stalk of celery into tubs, and it was estimated that about 90 percent of the larvae were being knocked off. Dipping the celery in various concentrations of pyrethrum and derris extract was found to be infeasible because of demands that the celery be kept dry for successful storage. The use of pyrethrum and tobacco dust did not appear feasible because it would be impossible to reach the worms, since the celery was stacked closely on the dirt floor of the house. Insecticidal measures would probably be unsatisfactory also, because of the low temperature in the house. It was decided that shaking was probably the most satisfactory control. One field was examined and worms were found to be rather numerous. In view of the facts that the temperature was in the 30's at the time of the examination and that there was little likelihood of obtaining high temperatures before the celery would have to be stored, it was deemed inadvisable to try to treat the field. The owner planned to shake all of the larvae out of the celery before placing it in storage.

Conference at Charleston, S. C.--A conference was held on November 27 to 28 at the South Carolina Coastal Experiment Station, Charleston, S. C. The following workers were present: C. O. Bare, F. S. Chamberlin, L. B. Reed, W. J. Reid, C. E. Smith, C. F. Stahl, J. N. Tenhet, W. A. Thomas, J. R. Weedon, and W. H. White. A general discussion of the arsenical-residue problem was engaged in, special emphasis being placed on methods of eliminating harmful residues on cabbage and tobacco. Methods of experimentation and sampling for worm populations and the difficulties encountered in applying treatments and the relative merits of various diluents and dusts also came up for discussion. This conference was of considerable value to all present, and brought out the fact that further experimentation will be necessary before general recommendations can be issued to the growers as to the most effective use of rotenone and pyrethrum compounds. Also, further work will be necessary on residues on cabbage before it can be definitely determined when treatment with arsenicals or similar compounds should cease in order to eliminate the possibility of residues reaching the market. The plan now is to continue these experiments another season in order to extend the work over a period in which varying climatic conditions are prevalent.

During Mr. White's visit to the South, in company with K. L. Cockerham of Biloxi, Miss., and Georgia State representatives, C. H. Gaddis and D. Moody, he visited the islands off the coast of Georgia where the seaside morning-glory clean-up work is being carried on with funds provided for emergency relief work. This work is under the direction of the State of Georgia, and is progressing very rapidly. Those in charge are to be commended for the thorough clean-up being made of this wild host of the sweetpotato weevil. Mr. White also visited the laboratory at Sanford, Fla., the trucking areas about Fort Myers and the Everglades, and the laboratory at Quincy.

FOREST INSECTS

Bark-beetle infestation shows decided decrease. A. L. Gilson, of the Coeur d'Alene, Idaho, field laboratory, reports that since 1926 an outbreak of the mountain pine beetle (Dendroctonus monticolae Hopk.) in lodgepole pine on the Beaverhead National Forest in Montana has been increasing in severity, until in 1932 more than 17,500,000 trees were killed on an area in excess of 1,340,000 acres. In the fall of 1932 there was every indication that the destruction in 1933 would at least equal that of the preceding year. However, when examinations of trees attacked in 1932 were made late in the spring of 1933, it was generally found that the only bark beetles that survived the extremely low winter temperatures were in the part of the tree that was below the surface of the snow. Two severe cold waves which swept over western Montana and portions of the adjoining States during the winter of 1932-33 are believed to have caused the heavy mortality of bark

beetles. This mortality was so great as to reduce the number of attacked trees on the Beaverhead to slightly over 915,000, little more than 5 percent of the number killed in 1932. In forests south and east of the Beaverhead, where continuous low temperatures over such long periods did not occur, the mortality of the beetles was not so high.

Bark-beetle infestation in California.--J. M. Miller, of the Berkeley, Calif., field laboratory, reports upon California conditions as follows: Compared with the conditions which existed at the close of the 1932 season, the past year shows decided improvement, with appreciable reductions in the intensity of bark-beetle infestations and timber losses. In the Sierra Forest the control work of the last 2 years has apparently broken the backbone of the heavy infestations. The effect of the control has been aided by natural factors, with the result that the amount of overwintering infestation in this forest is perhaps the lowest since 1923. In the Stanislaus Forest, where no control work was done prior to 1933, infestations have dropped perceptibly during the season, but are still fairly aggressive and can easily flare up into a bad epidemic if conditions during the coming winter and next season are favorable to the beetle. The Stanislaus infestation has not dropped to anything like the extent that it has in the Sierra. A fairly large insect-control program is now under way in this forest to meet the situation. In northeastern California the severe freeze of last winter set back the infestations in certain areas in the Modoc, Shasta, and Lassen Forests. Centers of live infestation escaped, however, and have shown a disturbing tendency to build up during the past summer. The coming winter is a favorable time to strike with control work to reduce the infestation now on the ground to as low a point as possible. Two fairly large projects are now under way in the Modoc and Lassen Forests. An infestation of only mild intensity is now in progress in the Eldorado Forest; but, because of public interest in the aesthetic features of the American River Canyon, a control project has been undertaken there to improve conditions in areas bordering the State highway. In southern California the infestation has been extremely light, except for one or two areas, notably Figueroa Mountain on the Santa Barbara Forest. Because of high recreational values and the accessibility of C C C camps, the more important areas were surveyed during the summer and a number of trees were treated by E C W labor.

Western pine beetle on the defensive.--F. P. Keen, of the Portland, Oreg., field laboratory, reports that the western pine beetle epidemic, which has been raising havoc in the ponderosa pine stands of the Pacific Northwest since 1917, is now definitely on the wane, as shown by the results of forest surveys just completed on 10 forest administrative units in Oregon and Washington. The number of trees attacked in 1933 was found to have dropped by 50 to 90 percent from

those killed in 1932, and in no instance was an increase reported. This improved situation is due to the destruction of broods by cold weather last winter and by improved vigor of the trees as a result of better moisture conditions. However, on some areas the beetles are showing signs of aggressiveness and are increasing the severity of their attacks. In such cases control work has been advocated and is now in progress on the Ochoco National Forest, the Deschutes National Forest, and the Yakima Indian Reservation. It is hoped that this work will result in permanently suppressing this very obnoxious pine destroyer.

Preserving fire-killed Douglas fir through tree medication planned.--Preliminary work on a new project, the prevention of insect damage to fire-killed Douglas fir, was begun in November by the Portland laboratory. It is planned as one phase of a larger cooperative project between the Bureau of Entomology, the Bureau of Plant Industry, and the Pacific Northwest Forest Experiment Station. J. M. Whiteside has recently been appointed on E C W funds to supervise the entomological phase for the Bureau of Entomology. The study is composed of two major parts: (1) A determination of the losses in fire-killed Douglas fir, what they consist of, and how rapidly and under what conditions they occur; (2) experiments on the prevention of these losses through tree medication, water storage, felling, etc. A series of fires of different ages are being located and mapped for further study. A small number of recently burned trees have already been injected with corrosive sublimate and eosin dye to determine whether or not these trees will take up the solutions. A work plan for the project is being made.

Foliage injured by insecticides.--S. F. Potts, of the Melrose Highlands, Mass., field laboratory, reports that in compiling data on foliage-injury experiments he finds that 0.35 percent of the arsenic applied to the leaf in lead-arsenate spray was recovered in the leaf tissue. This is 7 to 15 percent of the soluble portion and, when converted into grains of As_2O_5 per pound of leaves, is considerably above what the pure food and drug law allows on edible food. In the case of calcium-arsenate spray approximately 1.5 percent of the material applied was recovered in the tissue. Bordeaux mixture greatly reduced the quantity of tissue arsenic from calcium arsenate. In a 4-4-50 Bordeaux mixture, from 2 to 3.5 percent of the quantity of copper applied to the leaf surface was recovered in the tissue. The calcium arsenate in Bordeaux mixture adhered well, did not injure deciduous forest foliage, and was easily removed from sprayed surfaces with weak acids, as compared with lead and arsenic from lead arsenate.

Gipsy moth egg clusters more abundant.--Egg clusters of the gipsy moth are more abundant in New England this fall than last, judging by

counts and estimates made each year by workers at the Melrose Highlands, Mass., laboratory, in certain selected areas scattered through the territory generally infested with the pest. In 55 remaining "observation points," some of which were first located in 1911, the estimated average number of egg clusters per acre is at present 344, whereas it was 112 a year ago. In another series of 34 plots where sample collections of eggs, larvae, and pupae are made for parasite records the average estimated number of egg clusters per acre is now 1,675, whereas a year ago it was 680. Examinations of sample egg clusters from these 34 points have shown the average percentage of egg parasitization to be lower at present than a year ago although, because of the large increase in the number of egg clusters, there are actually more of the principal parasite, Anastatus disparis Ruschka, per acre.

Soil poisons for the control of white grubs.--L. G. Baumhofer, of the Coeur d'Alene, Idaho, field laboratory, reports that the final counts on mortality to transplant nursery stock in soil treated with powdered lead arsenate at the rate of 500, 1,000, and 1,500 pounds per acre, in white grub control experiments at Bessey Nursery, Nebraska National Forest, show an excessive loss of trees from the application of the poison in a light soil. The soil is a light sandy loam; the trees used were red cedar, Austrian pine, ponderosa pine, and jack pine. For 2-1 transplants (2 years in the seed beds and 1 year in the treated transplant bed) the mortality from the lightest dosage of lead arsenate was roughly four times the normal mortality; for the heaviest dosage, from five to seven times the normal mortality. For 1-1 ponderosa and jack pine practically a complete mortality resulted from all strengths used. Root development was retarded and height growth also somewhat stunted. The growth of cowpeas and rye, used as a cover crop, was seriously retarded, the stand varying directly with the quantity of material disked into the soil before planting.

Pine tip moth in Nebraska.--Mr. Baumhofer also reports that the decreased infestation of the pine tip moth (Rhyacionia frustrana bushnelli Busck) in 1932, as a result of high parasitization by the introduced parasite Camponotus frustranae Cush., was followed this year by a marked increase in height of ponderosa pine in the younger, outlying plantations in the Nebraska National Forest. The plot with the greatest growth, in a 10-year-old plantation, had a parasitization of 73 percent last year, which reduced the tip moth infestation from 96 percent of all leaders infested in 1931 to 59 percent infested in 1932. With 41 percent of the leaders uninfested in the spring of 1933, and a good growing season, these trees put on an average height growth of 10.2 inches. This growth is more than a 500 percent increase over the 1.8 inches averaged for 1932, and is 100 percent greater than the growth made in any one year since planting. The older plantations did

not show a corresponding rate of growth because of the serious damage being caused in these areas by a second species of tip moth, R. neomexicana Dyar, which is not affected by the introduced parasite.

CEREAL AND FORAGE INSECTS

Winter parasite-collecting season begins in Italy.--During November H. L. Parker, Hyeres, Var, France, organized and put into operation the winter parasite-collecting work at Falconara, Italy, with a staff of about 60 collectors. The braconid egg parasite Chelonus annulipes Wesm. has always been found in its greatest abundance in this region. Of 351,590 corn borer larvae collected thus far, 6.87 percent contained Chelonus, approximately the same ratio as was found last winter. For the period ending November 15, 17,678 larvae bearing Chelonus and 241,942 normal-sized corn borer larvae were shipped.

St. Louis chinch bug conference.--As reported by A. F. Satterthwait, Webster Groves, Mo., a chinch bug conference was called by L. Haseman, State entomologist of Missouri, for the purpose of obtaining cooperation between local institutions and administrators of railroads, State highways, and farm-holding insurance companies for the effectual control of the chinch bug by burning bunch grass and other winter covers. This conference was held in the Missouri Pacific Building, St. Louis, Mo., on November 29, and was well attended by administrators of railroads and farm-holding insurance companies. Dr. Haseman and Prof. Geo. Jones were in charge of the meeting, Merlin P. Jones represented the Federal survey of the chinch bug situation, and Professor Flint and J. H. Bigger represented the chinch bug control interests of Illinois. Evidence presented by maps indicated a very menacing outbreak of the chinch bug throughout a large portion of Illinois and Missouri, reaching into Kansas and Nebraska, and, according to Professor Flint's diagnosis, equal to or excelling the extreme infestation of about 1887, when damage was acute, even in Wisconsin. Wonderful cooperation was promised by the administrators of the railroads and of the farm-holding insurance companies and assurance was given that the State highway administrators will continue to cooperate. Cooperation of the farmers is assured through the numerous county farm bureaus.

Chinch bug hibernation quarters.--There seems to be a lack of published information on hibernating places of the chinch bug in some of the types of country where it is abundant this year. Philip Luginbill and W. B. Noble of the Lafayette, Ind., laboratory, are therefore attempting to determine its preferred winter quarters and habits in northwestern Indiana, with a view to ascertaining the practicability of winter burning as a method of control. Observations during November showed that most of the bugs have left the corn, although some stalks still contained as many as 75

adults. So far they have been found most abundant in the green leaf rosettes of mullein, fall asters, and other perennial broad-leaved plants; in clumps of timothy or Andropogon; and under wood debris along hedgerows and in open woods. The bugs were present in such situations by the hundreds, but very few were found in bluegrass sod or among dead or loosely growing plants. In one instance a closely grazed open woods, with no cornfield within 300 yards, was found to contain an abundance of adults hibernating under chips, chunks, and limbs lying on the ground. Thousands of bugs were located next to the ground under one chunk about the size of a half-bushel measure. Old cornstalks scattered sparsely in fields adjacent to this year's corn also contained considerable numbers of hibernating adults. It is notable that most of the above-mentioned situations appeared to be unfavorable to effective burning late in the fall or early in the winter because of the green, succulent condition of the plants or because of insufficient plant debris to carry a fire.

Heavy local infestations of range crane fly maggots likely in February 1934.--W. B. Cartwright, Sacramento, Calif., reports that the period of normal emergence of adults of Tipula simplex Doane in the upper San Joaquin Valley is from February 21 to March 14. In seasons having high temperatures and excessive rains in November and warmer than normal periods in December and January they emerge from February 7 to 21. A dry November followed by normal or excessive rains in December is a forerunner of an emergence from March 1 to 14, or 2 weeks later when there has been a cold season at the end of the year. Oviposition was heavy in the spring of 1933. As a dry, warm November has just passed, heavy, spotted infestations in the range lands are expected in February. Last spring adults were most numerous in the coastal range, especially on the eastern side. An emergence of adults in March 1934 is predicted.

Wheat varieties susceptible to strawworm in California.--Mr. Cartwright also states that in a test of 31 wheat varieties, Poso, Peliss, Mediterranean, and Illini indicated low susceptibility in 1932, but lost their rating in 1933 and were not of interest. The 1933 tests were represented by the commonly grown varieties Acme, Pacific Bluestem, Early Baart, Dawson, Federation, Little Club, and Turkey. Infestations of 100 percent were noted in Prohibition, Kawvale, Kanred, and Velvetnode, with intensities slightly greater than 2 strawworms for a productive culm, which represented high susceptibility. Varieties of low susceptibility, by comparison, exhibited a 40 percent infestation and 1 strawworm per infected culm. The wheat varieties tested ranged from moderate to high susceptibility; none were immune and only a few approached low susceptibility. Banyip rated lowest susceptibility in the 1933 tests.

Alfalfa aphid in Oregon on alfalfa, vetch, and Austrian winter field peas.--L. P. Rockwood, Forest Grove, Oreg., reports that the population of Illinoia pisi Kalt. on alfalfa gradually increased during October but declined early in November. This decline coincided with the progressive defoliation of alfalfa by fungous disease and frost, which was nearly complete by November 10. This is a condition that normally occurs every fall in the Willamette Valley. Sexual forms of Illinoia pisi appeared on alfalfa early in October and continued throughout the month. Alate viviparous females were produced very sparingly on alfalfa during October and early in November. The disease produced by the fungus Empusa aphidis Hoffman. was prevalent among the aphids on alfalfa late in October and early in November, and aphids parasitized by the internal hymenopterous parasites Aphidius and Praon were common as late as October 26. Our observations on I. pisi on volunteer and planted legumes, including vetch and Austrian peas, in various parts of the Willamette Valley confirm our conclusions that volunteer and early fall-sown annual legumes furnish foci for early fall establishments of large aphid populations. These concentrations produce alate viviparous females in numbers long after they have ceased to come from alfalfa and Scotch broom, and, when the winter is mild, alates in the spring are produced on these annual legumes from viviparous forms earlier than on alfalfa and broom from eggs. This year it seems that annual legumes seeded about October 20, or later, at a distance from any infested host plants, will remain free of I. pisi until the spring migrations. Our experience with plots indicates that this cannot be demonstrated by plots unless a large area for wide separation of the plots from other legumes could be made available.

Increase of alfalfa aphid in October in Nevada.--S. J. Snow, Salt Lake City, Utah, reports that Illinoia pisi occurred in greater numbers on the third crop of alfalfa in October than in any other month of the year, although it was too scarce to be of any importance. The estimates were obtained by sweeping various fields in which cutting had been delayed. The catch from a total of 3,150 sweeps throughout the month, and to some extent on frosted alfalfa, gave an average of 42 aphids per 25 sweeps. This great increase over a catch of 5.8 aphids in September and 1.7 in August is largely due to the fact that two fields became heavily infested, comparatively, in the middle of October. The cutting of the crop soon thereafter, however, and the heavy frosts quickly reduced this potentially injurious population. Winged forms were late in appearing and remained scarce in October and the early part of November. They increased from 0.3 percent in September to 3 percent in October. In the insectary, on the other hand, they increased rapidly during this period and greatly outnumbered the wingless forms. On warm days they were clustered by the hundreds on the screen sides of the insectary.

Alfalfa aphid laid eggs after frost in Nevada.--Mr. Snow also reports that after a 2 months' search for the eggs and the sexual forms of I. pisi, in which much alfalfa from the rearing cages and the fields was inspected and many aphids taken in the sweepings and from the stock cages were examined almost daily, eggs were first found in these cages on October 27 and in the fields on November 4. In the fields they were found on the upper and under sides of the leaves of the fourth-crop shoots. Wingless oviparous forms were first seen on November 6. Throughout November both the eggs and the egg-laying forms were found in small numbers on the alfalfa in the insectary. It is interesting to note that eggs were not laid until after repeated and heavy frosts. Their occurrence is important in indicating how the aphids survive the severe winters in this locality (Fallon, Nev.).

Alfalfa weevil outlook for 1934.--Geo. I. Reeves, Salt Lake City, Utah, reports that a careful survey of the alfalfa weevil (Hypera postica Gyll.) situation indicates that damage is likely to occur next year in Salt Lake and Beaver Counties, Utah, and in Churchill County, Nev. The other principal alfalfa-growing districts of these States, together with eastern and western Oregon, eastern and western Idaho, and the Western Slope of Colorado, are apparently not threatened.

Control of cutworms obtained in Louisiana.--A Louisiana sugar planter notified T. E. Holloway, New Orleans, La., about the middle of November that cutworms were destroying his alfalfa. Bran mash was advised, and the planter used this with great success. W. E. Haley, New Orleans, visited the plantation and collected specimens of the cutworms. These have been identified by Carl Heinrich, of the Division of Identification and Classification of Insects, as mostly Agrotis ypsilon Rott. with Lycophotia infesta Ochs., Anticarsia gemmatilis Hbn., early-stage larvae of Loxostege sp., and a species of Pieridae. It is of interest to note that the sugar planter found that sifted bagasse was equally as good as bran as an ingredient of the mash. Bagasse is, of course, the ground sugarcane after the juice is extracted. The planter was sifting some of it in order to make stock feed. In sugarcane districts, bagasse is much cheaper than bran.

Seed treatments of rice promise to repel attacks of sugarcane beetle.--W. A. Douglas and J. W. Ingram, Crowley and Houma, La., report that the sugarcane beetle (Euetheola rugiceps Lec.) has been known to destroy over 50 percent of the young rice plants during the month of dry growth between germination and the first application of irrigation water. In an effort to find some control, seed rice was treated with various repellent materials. The rice in each treatment was grown under a separate field cage and a uniform number of beetles was placed in each cage. None of the treatments injured germination. The yields from the plots are as follows:

	<u>Grams</u>
Line-sulphur dust	331
Line-sulphur spray	207
Bordeaux mixture dust	264
Bordeaux mixture spray	333
Kerosene	361
Paradichlorobenzene crystals	194
Commercial pitch	341
Check (replicated 7 times, average)	304.4

These results indicate that a further study should be made of lime-sulphur dust, Bordeaux mixture spray, kerosene, and commercial pitch.

Corn earworm in Georgia.--Geo. W. Barber, Savannah, Ga., reports that in Chatham County pupae of Heliothis obsoleta Fab. are present in the soil through the year, notwithstanding the long warm summer in this latitude. Although in some years moths begin to emerge from hibernation the last week of March, such emergence may not be completed until the last week of July. During this emergence period certain groups may have passed through three or possibly four generations in the field, as a generation occupies approximately a month. Some of the individuals that mature in June and July remain dormant as pupae in the soil in increasing numbers from June on, although larvae are found in the field until the middle of October.

Hessian fly control in the East.--Fall surveys and seeding-date plot sampling in the East Central States were completed, except in Tennessee, with results from 280 fields showing an average stem infestation of only about 1 percent. In the most heavily infested sample taken only 30 percent of the stems contained flies. The stages chiefly present in November in sown wheat throughout the territory were from half-grown to mature larvae.

Hessian fly infestations in winter wheat.--Summarizing surveys made by H. H. Walkden, E. T. Jones, and himself, J. R. Horton, Wichita, Kans., says: "The principal activity in November has been the sampling of hessian fly date-of-sowing plots and making a survey of infestations in winter wheat over the west central region. The information from the survey has not been completed but advance indications are that the fall sowings are lightly to moderately infested in most of the eastern third of Kansas, in northwestern and southwestern Missouri, and in south central Nebraska; in the central and southeastern portions of Missouri early sown wheat is moderately to heavily infested, most fields, however, being estimated as sown too late for effective infestation. In Oklahoma the fly shows indications of increase over what was found in the June survey, infestations being noted in several counties then prac-

tically free from the fly. Winter wheat made little growth and in some places in the western two thirds of Kansas and Nebraska deteriorated during November, owing to scant precipitation and deficiency of stored soil moisture, while in some areas in eastern Kansas, Oklahoma, and Missouri there was sufficient soil moisture to maintain wheat in fair to good condition."

Status of Great Plains grasshoppers.--A fall survey of grasshopper conditions in the Great Plains area was begun on September 20, and completed early in November. Entomologists in Idaho, Minnesota, Montana, North Dakota, South Dakota, and Wyoming cooperated with F. A. Morton, J. R. Parker, and R. L. Shotwell, of the Bozeman, Mont., laboratory, in conducting the field work. Results of this survey were presented to a regional grasshopper conference held at Fargo, N. Dak., on November 21-22. Over 300 persons, representing 7 States and 3 Canadian Provinces, attended the conference. The conference, through its resolutions committee, requested Federal aid to control the severe grasshopper outbreak predicted for 1934 and asked that the Bureau of Entomology conduct a grasshopper survey each year in order that areas where grasshoppers are building up may be known and control measures applied before the severe outbreak stage is reached. Over much of the area reported on, the lesser migratory grasshopper (Melanoplus mexicanus Sauss.) is the dominant species. Infestations of the same grasshopper are equally heavy in Saskatchewan and Manitoba and indicate the possibility of an extensive outbreak of the old Rocky Mountain grasshopper (Melanoplus spretus Uhl.), generally considered as being the migratory phase of M. mexicanus.

SUMMARY OF 1933 FALL GRASSHOPPER SURVEY BY STATES

State	Counties infested <u>Number</u>	Area that may need poisoning <u>Acres</u>
Idaho	10	120,000
Minnesota.....	20	279,834
Montana.....	49	3,613,058
Nebraska.....	10	200,000
North Dakota.....	53	5,439,680
South Dakota.....	68	2,567,396
Wisconsin.....	15	320,000
Wyoming.....	12	841,600
Total.....	237	13,381,568

COTTON INSECTS

Calcium arsenate for thurberia weevil on cotton.--T. P. Cassidy, Tucson, Ariz., reports that infestation counts made in the field indicate that calcium arsenate gives fair control of the thurberia weevil (Anthonomus grandis thurberiae Pierce) on cotton in Arizona. The test plats were located on the Papago Indian Reservation at Fresnal, Ariz. The first three applications of calcium arsenate were made between August 31 and September 12. On September 15, 18.33 percent of the bolls on the poisoned plat were infested, as compared with 39.83 percent infested in the check plat.

Hemipterous insects on cotton in Arizona.--Hemipterous insects probably cause more actual damage to cotton in Arizona than any other insects. Several species that cause similar injury by puncturing the bolls are involved. Preliminary studies by T. P. Cassidy of the damage caused by these insects in different cotton fields in the Buckeye, Chandler, and Sacaton areas indicate a probable succession of host plants, as has been found with similar insects affecting various crops in other sections of the country. In five fields where infestation records were made between October 23 and November 2 the percentages of bolls punctured was 46, 35, 28, 23, and 3. The field with only 3 percent infestation is located on a desert mesa with very few other plants growing in the vicinity, whereas the other fields are located in cultivated areas surrounded by crops of cotton, alfalfa, wheat, hegari, etc. The infestation, as indicated by punctured bolls, did not become serious in these fields until about August 1, when there was apparently an influx of hemipterous insects into the cotton fields, where they were very abundant during August. By September 5 they seemed to be disappearing and early in October had practically disappeared from the cotton fields. As wheat in that section is harvested late in June and early in July and it is the practice to take the water off the alfalfa and graze the fields during August and September, it is possible the appearance of the hemipterous insects in the cotton fields early in August is due to their migration from these other crops when the crops are harvested or go down from lack of water or from grazing, or both.

Abundance and Condition of Boll Weevils Entering Hibernation this Fall.

Reports have been received from field stations and State officials on the abundance and condition of the boll weevils entering hibernation this fall from six States located in different parts of the Cotton Belt:

Oklahoma.--H. C. Young, Eufaula, reports that all of the cotton in that vicinity was killed by frost on November 8, 3 days earlier than in 1932. Weevils were difficult to find in the fields by November 14.

However, the lowest temperature recorded for November 1933 was 29° F., as compared to 15° F. in 1932, and the average for the month was 41.4° F., as compared to 33.9° F. in November 1932. It is thought that more weevils entered hibernation in good condition than last year.

Arkansas.--Dwight Isely, Entomologist, Fayetteville, reports that the numbers of boll weevils that have gone into hibernation in the northern half of the State are probably greater than average; in the southern part of the State the numbers were not more than average, while in the Arkansas river bottoms in the western part of the State conditions are much more favorable than last year and probably would approach those of the fall of 1931. Late outbreaks of the cotton leaf worm (Alabama argillacea Hbn.) in September have doubtless reduced the number of weevils in many places.

Texas.--E. W. Dunnam, College Station, reports that the cotton curtailment program in operation this season apparently favored boll weevil development. Many of the old stumps that were plowed under sprouted and quickly produced new growth. This was augmented by the young cotton produced from the mature seed in the cotton plowed under. Late in the season when most of the cotton was maturing its crop and defoliation by the cotton leaf worm was in progress, this small green cotton on the plowed land practically escaped leaf worm damage and offered an abundance of food, and later, favorable breeding places. By the time the cotton crop had been harvested and these fields had been plowed the second time, most of the productive fields had put on a luxuriant second growth, following the leaf worm defoliation, and provided a continuous supply of food for the weevils until late in the season. A heavy rainfall during the growing season was partly responsible for this peculiar situation. The normal precipitation for this locality during July is 2.45 inches, and the actual was 5.46; the normal for August is 2.32, and the actual was 4.69; and for September the normal is 2.66, and the actual was 3.23. Apparently we have a much heavier boll weevil population at this time of year than we have had here for several years. Much of the cotton has not been killed by frost to date (December 4) and the weevils have therefore been able to feed at least 20 days longer than in 1932, and will go into hibernation in fine condition. With reduced cotton acreage next season, it stands to reason that there is a chance for a heavier weevil population in the spring of 1934 than at any time in the past several years. T. C. Barber, Brownsville, reports that the continued warm and moist weather during November has caused some of the cotton to put out new growth after the September hurricane and produce a few stunted squares and blooms in which weevils have continued to breed. Weevils are still scarce in the fields but collections of squares have yielded a continually increasing number of weevils, indicating that they are gradually regaining their numerical strength. The adults are extremely small, some being only one third to one half normal size. Just what effect this will have on the winter survival is still problematical.

Normally sufficient cotton is available throughout the winter to permit continuous feeding on warmer days during the winter months.

Louisiana.-- R. C. Gaines and G. A. Maloney, Tallulah, report light frosts on November 9 and 10, but favorably located fields escaped and were still green till November 16, with a fair weevil population present. A heavy movement of boll weevils from the field in Madison Parish occurred from November 18 to 21, as shown by the catch on the flight screens. During this period 589 of the total of 1,255 weevils caught during November were captured. The total catch per screen was just a little less than in November 1932.

Mississippi.--Clay Lyle, Entomologist, State College, reports killing frosts over most of the State on November 9, 10, and 11. Weevils are about as abundant as a year ago in Holmes, Hinds, and Lincoln Counties in the central and southwestern parts of the State; about 75 to 80 percent as abundant in Grenada, Lee, Monroe, and Lauderdale Counties in the north central, northeastern, and eastern parts of the State; much less abundant in Stone County, in the southeastern part of the State; and only 20 percent as abundant in Bolivar County, in the Delta in the northwestern part of the State.

South Carolina.--F. F. Bondy, Florence, reports a killing frost on November 9, with weevils scarce in the fields after that date. November in general was cold and very dry, and from all records made during the fall, which include screen trapping and catching weevils for the hibernation cages, there is no doubt that the numbers of weevils in the fields were far less than in any year since 1928.

Boll weevil parasites in Mississippi.--P. M. Gilmer, Tallulah, La., reports considerable variation in the percentage of parasitization of boll weevils, as shown by the emergence from weevil-infested squares taken in several counties in Mississippi late in August. In Warren County the parasitization was one half of 1 percent, while in Oktibbeha County it averaged 10.06 percent. Other counties in the northeastern part of the State, not far from Oktibbeha, averaged about 4 percent, while in the south central part of the State parasitization was exceedingly low, some counties showing only a fraction of 1 percent.

Croton destruction to control cotton flea hopper.-- K. P. Ewing, Port Lavaca, Tex., reports the first extensive experiment in controlling the cotton flea hopper (*Psallus seriatus* Reut.) by the destruction of its winter host plants, *Croton* spp. At this season practically every croton plant in that vicinity contains flea hopper eggs and studies show that over 98 percent of the overwintering hopper eggs are deposited in croton. The Civil Works Administration of Texas has approved an allotment of \$20,000 for the Calhoun County Croton Weed Destruction

Project. The destruction of croton plants began on Thursday, December 7, 1933. On December 11 Mr. Ewing reported that 30 C. W. A. men were working with 23 teams, mowers, or rakes, and on December 15 he reported 100 men with 28 teams attached to mowing machines and rakes. In the supervision of this project Mr. Ewing is assisted by Rex McGarr, G. L. Smith, R. W. Moreland, and J. C. Clark. There are about 360,000 acres in Calhoun County, a survey of which, made in October 1933, showed that 17,590 acres had croton plants on them. The present plan is to destroy the croton on 9,880 acres located in proximity to cotton fields or from which it is thought the hoppers may spread to cotton.

Pink bollworm infestation in Laguna District, Mexico.--H. S. Cavitt returned to the Presidio, Tex., laboratory on November 20 from the Tlahualilo, Dgo., Mex., sublaboratory, where he has been assisting C. S. Rude during the summer, studying the age of cotton bolls susceptible to pink bollworm attack and the extent of damage caused to bolls of different ages. In these studies 118,000 blooms were tagged and the bolls produced from them collected for further examination. He reports that although the early and midseason pink bollworm infestation in the Laguna was very light, it became very heavy late in the season. Examinations of cotton bolls from the heavily infested Laguna section of Mexico by C. S. Rude showed an average of 4.7 pink bollworm larvae per boll in the material used for hibernation studies. Another examination of a 30-pound sample of seed cotton showed an estimated population of over 10,000 larvae, or at the rate of 500,000 pink bollworms per bale.

Large numbers of pink bollworms hibernating in soil this year.--F. A. Fenton and W. L. Owen, Jr., Presidio, Tex., report that soil examinations from heavily infested fields in the Big Bend show more pink bollworms hibernating in the soil this year than usual. The pink bollworms hibernate as larvae, and in the field over 90 percent are normally found in the squares, lint, and seed attached to the stalks or on the soil surface, whereas the others leave the squares and bolls and spin silken cocoons (webs) in the soil or on the roots of the plants. By thoroughly cleaning the fields of all crop debris, as is being done this year by the Bureau of Plant Quarantine as a repressive measure, most of the larvae above ground are destroyed. Complete reports are not yet available of the number or percentage of the worm population hibernating in the soil this year, but the examination of 5 to 10 square yards of soil from each of seven fields to a depth of 2 inches shows that in the various fields the number of larvae ranged from 0.7 to 4.5 per square yard, showing that an average of 3.26 larvae per square yard have "spun up" in the soil. In the fields examined over 15,000 larvae per acre will therefore remain in the soil, where they cannot be reached by the clean-up. The worm population is less than last year, and it is not known why more worms have hibernated in the soil than was the case last year.

Parasites of the pink bollworm.--Sufficient numbers of the parasite Exeristes roborator Fab. were bred up in the laboratory at Presidio, Tex., by L. W. Noble and S. L. Calhoun to make several small releases in October. Further field recoveries of Microbracon brevicornis show that at least two generations bred in the field this fall.

INSECTS AFFECTING MAN AND ANIMALS

The one hundredth anniversary of the birth of Carlos Findlay, the Cuban scientist whose keen powers of observation and deductive ability caused him to point unerringly at Aedes aegypti L. as the carrier of yellow fever and thus greatly hasten the lifting of the burden of that terrible scourge of the New World, was commemorated by the Pan American Medical Society in the Cuban Embassy on December 3. Dr. L. O. Howard, who was a friend of Doctor Findlay, was invited to speak on Importance to Mankind of the Discovery of the Transmission of Disease by Insects. General Kean, an associate of Doctor Findlay and General Gorgas in the fight against yellow fever in Cuba; Colonel Brooke, representing Doctor Patterson, Surgeon of the Army; and several others spoke. Dr. Hugh Cummings, Surgeon General, U.S. Public Health Service, presided. Dr. D. E. Findlay, son of Dr. Carlos Findlay and a member of the Cuban cabinet, was present.

The meetings of the American Society of Tropical Medicine and National Malaria Committee were held in conjunction with that of the Southern Medical Society in Richmond, Va., on November 14 to 16. They were well attended and numerous interesting entomological papers were presented, although very few entomologists were present. F. C. Bishopp was chosen vice chairman of the National Malaria Committee, of which L. O. Howard has been Honorary Chairman for a number of years.

Control of sand flies as a relief project.--Arrangements have been made for the use of Federal funds for construction of drainage ditches and tidal gates in the salt marshes of Georgia and South Carolina, for the purpose of reducing the breeding of sand flies. This work will also diminish the breeding of salt-marsh mosquitoes and in addition will reclaim many small areas of land from the marshes. W. E. Dove reports that considerable interest is being taken in this program and that numerous visitors have been conducted to the place where the preliminary work is going on. He states that they are favored with the splendid cooperation of M. S. Yeomans, State entomologist of Georgia, and of influential residents of Savannah.

Surgical use of blowfly maggots.--The use of sterile maggots in the treatment of infected wounds continues to grow and there are now about 1,000 surgeons using this method of treatment. Shipment of maggots by mail is a common procedure and so far this has been done by packing bottles of maggots next to ice, which is an expensive method.

S. W. Simmons, of the Washington Office, has devised a food which alone will effectively retard growth of maggots while they are in the nails. It is very simple and inexpensive, consisting of equal parts of whole sweet milk and water with the addition of $1\frac{1}{2}$ percent agar. This food permits long-distance shipments of maggots without any ill effects.

W. G. Bruce of the Ames, Iowa, field laboratory, in cooperation with the Department of Veterinary Medicine at Iowa State College, is making some preliminary trials of the use of maggots in fistulas and other wounds in horses.

Trapping of screw worm flies.--E. W. Laake, Dallas, Texas, states that the population of all species of flies in the trapped areas has been reduced by about 63 percent, as compared with the population in nontrapped sections. From March 1 to October 28 a total of 30,930 quarts of flies were taken from 673 traps.

A Federal Civil Works project for pest mosquito control in 36 States and employing about 25,000 men was begun the latter part of November. The most extensive work will be done along the Atlantic and Gulf coasts and will include the draining of considerable areas of salt marshlands in which mosquitoes breed in enormous numbers. In most of the States the State entomologists are acting as Federal agents. A Federal Civil Works project for the control of the American dog tick (Dermacentor variabilis Say), which transmits Rocky Mountain spotted fever, has also been instituted. This provides for work in the States of Virginia, Maryland, Delaware, and the District of Columbia. The plan includes the cleaning up of woodlands and the eradication of mice and other rodents that are hosts of ticks. The Division of Insects Affecting Man and Animals is responsible for the general direction and supervision of these projects.

HOUSEHOLD AND STORED PRODUCT INSECTS

W. D. Reed, of the cured tobacco insect laboratory at Richmond, Va., who last summer made a study of insect pests of tobacco at various tobacco manipulation and storage points in the Eastern Mediterranean area, particularly in Greece and Turkey, and in the warehouses of London, returned to Washington late in November and is preparing a report of his observations. It is hoped that contacts established through the courtesy of His Excellency Ali Rana Bey, Minister of Customs and Monopolies, Turkey, and Hon. Gean G. Theotoki, Minister of Greece, will result in fewer insects in tobacco imported into this country, a source of loss to American tobacco manufacturers. It is believed that the conferences held in London with officials of the Imperial College of Science and Technology and of the Port of London Authority, as well as with various tobacco establishments, will result in increased facilities at London for handling American tobacco showing infestations by common tobacco pests.

G. B. Wagner states that reports are being received daily that heavy infestations of grain are developing throughout the entire Southwest. These reports generally concern 1- to 3-year-old wheat stored in elevators. The lesser grain borer (Rhizopertha dominica Fab.) seems to be increasing in grain stored for longer periods than usual, and in some such grain it is doing as much damage as the better known and widely distributed rice weevil (Sitophilus oryza L.).

Examinations made during November by T. A. Brindley at Moscow, Idaho, indicate that the mortality among hibernating pea weevils (Bruchus pisorum L.) is very light. These examinations will continue throughout the winter. In experiments conducted during the past growing season to determine the value of dusting with calcium arsenate, Mr. Brindley has found that 30 percent of the seeds were infested at the end of the experiment in the dusted plot, as compared with 86 percent in the check plot. In another experiment, conducted under cages, thereby eliminating the early infestation which usually occurs in the open field, it was found that only 0.2 percent of the seeds became infested on the dusted vines, as compared with 90.6 percent infested on the check vines.

A. O. Larson and F. Hinman report that a check made on the peas fumigated throughout the Willamette Valley indicates that the results were very satisfactory. Chloropicrin was the fumigant most often used, 100 percent of the weevils being killed in three fumigations and 97.3 percent in a fourth.

The Dried Fruit Association of California estimated several years ago that the annual cost of fumigation as employed by members of the Association was about \$100,000. Perez Simmons states that the technologist for one large firm of packers of dried fruits in California says that at one plant of his company the cost of fumigation is about \$2,000 per month.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

A. G. Boving has received, through the National Museum, from Paul N. Musgrave, Fairmont, W. Va., two very rare larvae representing the immature stages of the water beetle Ancyronyx variegatus Germ.

Doctor Boving has identified for C. R. Crosby, of Cornell University, larval specimens of a weevil which, from comparison with determined European material in the National Museum collection, appear to be Stiorhynchus ligustici L. These specimens were found in destructive numbers on alfalfa roots, in Oswego County, N. Y. Further confirmation of this identification of the larval specimens is indicated from the fact that adults of this same species, collected in the same vicinity, were identified last year by L. L. Buchanan, of this division, as

O. ligustici L. This insect is one of several species in the genus Otiorhynchus that have come to light in recent years in this country as apparently introductions from Europe.

E. A. Chapin reports the presence, in a collection of miscellaneous Scarabaeidae submitted for identification by S. T. Danforth, of two specimens of Podischnus agenor Oliv. from Colombia which bear labels indicating that the species becomes at times a pest of sugarcane. This species is not included in such lists of sugarcane pests as are available to him.

W. S. Fisher has recognized the European ptinid beetle Ptinus sexpunctatus Panz. from material collected in a bag with poplar seed, in Germany (B.P.Q. No. A 24140). This species is not known to be established in the United States.

F. H. Benjamin has identified two male moths, reared from larvae feeding on pitch-pine needles, at South Carver, Mass., and sent in to F. C. Craighead by H. J. MacAloney, Amherst, Mass., as Ellopija athasaria Walk., variety close to pellucidaria G. & R.

R. A. Cushman has received from G. S. Walley, of the Canada Department of Agriculture, Ottawa, and has placed in the National Museum collection specimens of Hyposoter pilosulus (Prov.) and paratypes of Hypotherutes clarus Vier., Syzeuctus eximius Walley, and Glypta infumata Walley.

In 1929 a consignment of Chalcidoidea reared by Miss M. N. Nikolskaia at Poltava Agricultural Experiment Station, Poltava, Russia, from alfalfa seeds was received by A. B. Gahan. The lot contained a number of different species, several of which had already been tentatively identified by Miss Nikolskaia. Comparison of this Russian material with material reared from alfalfa seeds in America was requested. In the material were several specimens which Miss Nikolskaia had identified as Bruchophagus gibbus (Boh.) and which she suspected might be identical with B. funebris (How.), the well-known clover seed chalcid of America. Comparison of her specimens with Howard's types, together with other specimens reared from alfalfa and clover in this country, failed to show any differences. Indirect but convincing proof that the Russian and American Bruchophagus were the same species was found in the fact that several of the parasites were also identical. Liodontomerus perplexus Gahan, Tetrastichus bruchophagi Gahan, T. venustus Gahan, and Habrocytus medicaginis Gahan, all described as parasites of the clover seed chalcid in America, were found to be represented in the Russian material. Eupelmella vesicularis (Retzius), a European species already recorded in this country as a parasite of the hessian fly, as well as of the clover-seed chalcid, were also found in the Russian material.

Miss Nikolskaia recently published a short paper entitled The Clover Seed Chalcid (Bruchophagus gibbus Boh.) in Alfalfa Seeds in USSR (Plant Protection, Leningrad, fasc. 1, 1932, pp. 107-111), in which she has recorded the above-mentioned identifications among others, and has indicated that Bruchophagus funebris (How.) is to be replaced by B. gibbus (Boh.) as the name for the clover seed chalcid. While it is impossible to confirm this conclusion completely without access to Boheman's type of B. gibbus, it nevertheless appears altogether probable that the synonymy is correct. Specimens in the National Museum collection identified by Gustav Mayr as Boheman's species apparently are identical with B. funebris.

H. G. Barber has recently received for determination several specimens of a pretty little mirid, Halticotoma valida Townsend, found feeding on yucca in Washington and the neighboring towns of Alexandria and Rosslyn, Va. From the evidence at hand this insect seems to have reached northern Virginia and the District of Columbia only recently. It was originally very briefly described from New Mexico in 1892 by C. H. Tyler Townsend and later (1913) redescribed by O. M. Reuter from Arizona and Texas. However, it must have been widely distributed through the Southern States previous to the time of Townsend's account, as there are a number of specimens in the National Museum collection labeled "Eustis, Florida, May 22, 1925 (on yucca)." H. H. Knight in 1912 noted its occurrence on yucca from Colorado, Mississippi, Tennessee, and South Carolina. Other States represented in the National Museum collection are Kentucky and Georgia. This mirid is, therefore, well established throughout the South. Its appearance in this locality appears to present another case, similar to that of Corizus sidae Fab., in which a normally southern species gradually works farther and farther north.

PHYSIOLOGY AND TOXICOLOGY OF INSECTS

M. C. Swingle and J. F. Cooper, Takoma Park, Md., are rearing the following five species of insects at Sanford, Fla., for tests of fixed nicotine preparations: The bean leaf roller, the imported cabbage worm, the celery leaf tier, the southern armyworm, and the black cutworm. Only a few tests have so far been made. It was surprising to find that nicotine silicotungstate, a very insoluble compound employed for the quantitative determination of nicotine, was more toxic than a sample of nicotine-ba toxin containing 10 percent nicotine. The cutworms are much more resistant to nicotine than are the other species.

N. E. McIndoo, Takoma Park, in cooperation with R. C. Roark, of the Bureau of Chemistry and Soils, is working on a bibliography of tobacco products as insecticides.

J. W. Bulger, Takoma Park, in testing acetone extracts of Cracca against mosquito larvae, found the extract of Cracca latidens much more toxic than extracts of roots of other species, in agreement with tests of kerosene extracts of the same 9 samples by Campbell and Sullivan against house flies.

Further comparative tests by F. L. Campbell and W. H. Sullivan of kerosene extracts of Cracca latidens and Derris elliptica emphasized the superiority of the latter against house flies. An extract of derris, one fourth pound per gallon, was more effective than an extract of Cracca at the rate of 2 pounds per gallon. The rapid laboratory method now being used for the testing of these extracts has aroused the interest of the household insecticide industry as a possible substitute for the Peet-Grady method.

EXCHANGE OF USEFUL INSECTS

Two shipments of material containing parasites of the wooly apple aphid (Eriosoma lanigerum Hausm.) were forwarded to foreign countries in November. The material was collected by M. A. Yothers at Wenatchee, Wash., where the parasite Aphelinus mali Hald. has become very well established in recent years. One consignment was sent to Colombia through the Division of Agricultural Cooperation of the Pan American Union. The second lot was sent to C. H. Ballou, formerly of this Bureau, for liberation at San Jose, Costa Rica.

BEE CULTURE

Both the Southern States Bee Culture Field Laboratory, Baton Rouge, La., in charge of Dr. Warren Whitcomb, Jr., and Division headquarters, Somerset, Md., have been consulted almost constantly with respect to the marketing agreement for package bees and queens which the Bee Shippers' Federation, headquarters at Auburn, Ala., has submitted to the Agricultural Adjustment Administration. The Bee Shippers' Federation was organized for the purpose of applying for a marketing agreement, and its membership consists of producers of package bees and queen breeders of the United States. A great many informal conferences have been held in Washington and several conferences have been held in the field by various subsidiary State organizations. The Agricultural Adjustment Administration announced that the formal or public hearing on the agreement will be held in New Orleans on December 13. This meeting is expected to be well attended by package producers and queen breeders from all over the country. Representatives from the division headquarters and from the Baton Rouge laboratory will assist at the hearing.

As a result of a meeting called by the American Honey Producers' League, in Chicago on October 13 and 14, a committee was appointed, headed by Prof. C. L. Corkins, Powell, Wyo., to draft a marketing agreement covering all bee products. This agreement is intended to include all beekeepers except the producers of package bees and queens. The Department of Agriculture has received a preliminary copy of the agreement but it is too early to prophecy just what progress beekeepers can expect to make in drawing up a document intended to place the business of producing and marketing honey on a plane with that which the producers of package bees and queens hope to obtain from their agreement.

The United States postal regulations specify that live bees, other than queen bees in mailing cages, must be mailed in a cage having two thicknesses of wire screen, the purpose being to lessen the possibility of escape of the bees and also to protect the handlers of mail from being stung. Several attempts have been made by shippers of bees to have the regulation changed so that a cage having only a single thickness of screen wire could be used, but in the past the Post Office Department has not seen fit to change this regulation, as the cages submitted have not met with the approval of the Post Office Department. The Bee Culture laboratory recently designed a single-screen cage to which the Post Office Department has given informal approval. This cage will be submitted to the shippers of package bees who, in turn, will make a formal request to the Post Office Department that the regulations be changed. The new cage will be much cheaper to construct and will enable producers to obtain package bees through the mails for about 20 cents per cage less than is now possible.

Jas. I. Hambleton, Somerset, inspected the honey-handling equipment recently installed by the Huber Baking Co., at Wilmington, Del. This company has prominently featured a bread made with honey and its success in this field has been so gratifying that it is now undertaking to bottle and sell honey, employing its regular sales and delivery force to dispose of the honey. All honey is to be graded and sold on the basis of the United States grades. This company has installed a unique method for heating honey. The honey passes through a steam-heated coil. During the two minutes that the honey is passing through the coil it is heated to as high as 180° F. The honey is then strained and bottled and allowed to cool at room temperature. Subjecting the honey to this temperature for such a short period of time apparently does not alter either the flavor or the color of the honey, and on 5 minutes' notice an operator can start bottling, whereas, with most systems of heating honey a half day's preheating is usually necessary before the honey can be bottled.

WHERE CERTAIN INSECTICIDAL MATERIALS MAY BE OBTAINED

The list of dealers of certain insecticidal materials given below has been prepared by R. C. Roark, of the Insecticide and Fungicide Division of the Bureau of Chemistry and Soils. It is presented for your information, but not as a complete list of dealers in these supplies, and without guarantee or endorsement of the firm or the quality of their products.

Bentonite

Jerome Alexander, 50 East 41st St., New York, N. Y.
American Colloid Co., Transportation Bldg., Chicago, Ill.
Nathan and Co., 8 South Dearborn St., Chicago, Ill.
A. E. Starkie Co., 1 N. Crawford Ave., Chicago, Ill.
Tamms Silica Co., 228 N. LaSalle St., Chicago, Ill.

China Clay

American Cyanamid & Chemical Corp., 535 Fifth Avenue, New York, N. Y.
Charles B. Chrystal Co., Inc., 11 Park Place, New York, N. Y.
Hammill & Gillespie, Inc., 225 Broadway, New York, N. Y.
E. & F. King and Co., Inc., 399 Atlantic Ave., Boston, Mass.
Star Clay Corp., Reading, Pa.

Cube and Cube Extracts

Lawrence Bros., 332 Leavenworth St., San Francisco, Calif.
R. F. Letts, P. O. Box 2300, Lima, Peru.
Peruvian Cube Corp., P. O. Box 809, Lima, Peru.
R. H. G. MacArthur, P. O. Box 296, Paramaribo, Dutch Guiana, S. A.
R. Rumsey, 89 Front St., New York, N. Y.
McCormick and Co., Baltimore, Md.

Sulphonated Oils

L. Sonneborn Sons, Inc., 88 Lexington Ave., New York, N. Y.
Standard Oil Co. of California, 225 Bush St., San Francisco, Calif.
Sun Oil Co., Philadelphia, Pa.

Talc

Arnold, Hoffman & Co., Providence, R. I.
Binney & Smith Co., 41 East 42d St., New York, N. Y.
Charles B. Chrystal Co., Inc., 11 Park Place, New York, N. Y.
A. C. Drury & Co., Inc., 106 East Austin Ave., Chicago, Ill.
F. N. Giavi, Inc., 96 North Moore St., New York, N. Y.

Turkey Red Oil

Arnold Hoffman & Co., Inc., Providence, R. I.

Glyco Products Co., Inc., Bush Terminal Bldg., No. 5, Brooklyn, N. Y.

Frederick P. Kapper & Co., 367 Fulton St., New York, N. Y.

L. Sonneborn Sons, Inc., 88 Lexington Ave., New York, N. Y.

Jacques Wolf & Co., Passaic, N. J.